Name: _____

SCEGGS Darlinghurst

2009
Year 9
Semester 1 Examination

Mathematics (Pathway 5.3+)

Outcomes tested: MS 5.1.2, MS 5.2.3, PAS 5.1.1, PAS 5.3.1, WM 5.3.1, WM 5.3.2, WM 5.3.3, NS 5.1.1 and NS 5.1.2

General Instructions

- Time allowed - 1½ hours
- This paper has **four** questions
- **Carefully** read the instructions at the beginning of each section
- Attempt **all** questions.
- Write your name where indicated
- Show **all** your working in the spaces provided for each question
- Marks may be deducted for careless or badly arranged work
- Circle the words General Instructions above to show that you have read these instructions
- Mathematical templates, geometrical equipment and scientific calculators may be used

Questions	Possible Mark	Mark Awarded
1 Earning Money	20	
2 Indices	20	
3 Products and Factors	20	
4 Trigonometry	10	
TOTAL	**70**	
	100%	

Name: ...

Marks

Question 1 (20 marks) **Earning Money**

(a) If Genevieve works from 3:30 pm to 6:30 pm 3 days each week and earns $139.50, find her hourly pay rate. **1**

(b) Sue works 40 hours a week from Monday to Friday, earning $26 an hour.
She is paid time-and-a-half for overtime hours.
On Monday, Sue works 2 hours of overtime.
She works 5 hours of overtime on Wednesday and 2 hours of overtime on Thursday.

(i) Calculate Sue's earning for the week **1**

(ii) Calculate Sue's average earnings per day for the week. **1**

(c) Clive's dog washing business charges $60 for large dogs, $50 for medium dogs and $45 for small dogs. **1**
Clive earned $570 when he washed 4 small dogs, 3 medium dogs and some large dogs. How many large dogs did Clive wash?

Question 1 continues on the next page

Marks

Question 1 (continued)

(d) A company accountant calculates the weekly pay using the following formula: **1**

$P = S \div D \times 7$
P = weekly pay
S = salary
D = number of days in this year

If Lee's yearly salary is $72000, what is the difference between his weekly pay in a leap year and in a non-leap year?

(e) John is paid a weekly retainer of $1000, plus a commission of 8.5% on all sales. **2**
John will be paid a total of $1956.25 this week. Calculate the value of his sales.

(f) Bill's firm made a profit of $1 800 000 in its first year. **2**
Because of Bill's clever marketing, the next year profits increased by 15%.
Bill received a bonus of 12% of the ***increase*** in profits. How much is Bill's bonus?

Question 1 continues on the next page

Name: ..

Marks

Question 1 (continued)

(g) Fred buys a fortnightly train ticket for $85, allows $15 each day for lunch at work (Monday to Friday) and buys a magazine for $8.60 when it comes out every 4 weeks.

(i) Calculate the total of Fred's expenses for 4 weeks. **1**

(ii) Calculate the total of Fred's ***weekly*** expense budget. **1**

(h)

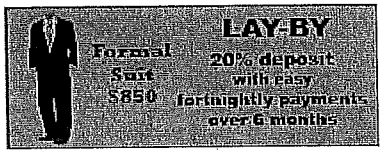
Calculate the minimum amount you will pay if you enter into this phone contract. **1**

(i) Which purchase represents the better value? **2**
Offer A: Take 10% off the regular price of 12 cans for $5.50
Offer B: Take 20% off the regular price of 24 cans for $12.
(All necessary working must be shown.)

Question 1 continues on the next page

Marks

Question 1 (continued)

(j) 

2

Calculate the amount of each payment to the nearest cent.
(Assume 1 year = 52 weeks.)

(k) Andrew invests $11 500 for 2 years 6 months at 7.25% pa. 2
Find the value of the investment at the end of the term.
(Answer to the nearest cent.)

(l) Eliza is paid $17\frac{1}{2}\%$ holiday loading for 4 weeks of her annual holiday.
Her usual pay for 4 weeks is $2456.

(i) Calculate her loading for the 4 week period. 1

(ii) What is her total pay for the four week holiday period? 1

Name: Evelyn Lazanas

Marks

Question 2 (20 marks) **Indices**

(a) (i) Express 0.000 059 7 in scientific notation. 1

(ii) Simplify, giving your answer in scientific notation. 1

$\sqrt{1.44\times10^{-6}}$

(b) Simplify:

(i) $3x^{\frac{1}{2}} \times 4x^{\frac{1}{2}}$ 1

(ii) $(49m^6)^{\frac{1}{2}}$ 1

(c) If $x = 2$, $y = 3$ and $z = \frac{1}{2}$, evaluate:

(i) $x^{-1} + y^{-1}$ 2

(ii) $(xz)^{-1}$ 2

Question 2 continues on the next page

Marks

Question 2 (continued)

(d) Write $36q^{-4}$ without a negative index. **1**

(e) Simplify:

(i) $(-4)^2$ **1**

(ii) $(2y^3)^4 \div (4y^6)^2$ **2**

(iii) $6(a^3)^0$ **1**

(iv) $x(x^2 - 7x + 1) - (x^3 - x^2)$ **2**

(v) $(2^x)^2 \div (2^{1-x})^2$ **2**

Question 2 continues on the next page

Name: .../

Marks

Question 2 (continued)

(f) Consider the expression $5v^{-10}$. If $v = \frac{1}{20}$, then the value of the expression would be: **1**
(Circle the correct response.)

(A) An extremely small number.

(B) An extremely large number.

(C) Very close to 5.

(g) Solve the following equation: **2**

$3^x \times 3^{x+4} = 243$

Question 3 (20 marks) **Products and Factors**

Marks

(a) Simplify

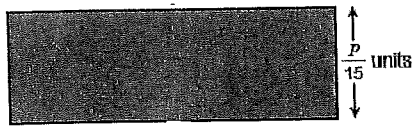
(i) $\frac{2d}{3} + \frac{h}{2}$ **1**

(ii) $\frac{12a^6}{b} \times \frac{b}{4a^7}$ **2**

(b) The average of two fractions is $\frac{3u}{10}$. **2**

If one of the fractions is $\frac{u}{5}$, what is the other fraction (in simplest form)?

(c) **1**



The perimeter of this rectangle is $\frac{26p}{15}$ units.

What is its length (in terms of p)?

Question 3 continues on the next page

Name: ....

Marks

Question 3 (continued)

(d) The area of a rectangle in square units is $5m^2 - 10m$. **1**
If one of the sides has a length of $5m$ units, what is the length of the other side?

(e) Factorise the following expressions.

(i) $5x^2 + 15x$ **1**

(ii) $-26y^2 - 13y$ **1**

(iii) $2m^2 - 9m + 10$ **1**

Question 3 (e) continues on the next page

Marks

Question 3 (continued)

(e) Factorise the following expressions.
(cont.)

(iv) $32y^2 - 2x^2$ **2**

(v) $ab - 2a - 5b + 10$ **2**

(vi) $\dfrac{x+1}{x^2+4x+4} - \dfrac{x-2}{x^2+x-2}$ **3**

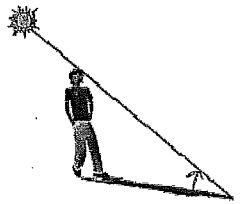
(vii) $\dfrac{2p^2+p-6}{4p^2-9} \div \dfrac{p^3-4p^2-4p+16}{2p^2-p-6}$

Name: .....

Marks

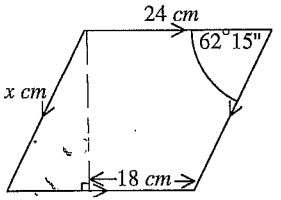
Question 4 (10 marks) **Trigonometry**

(a)



A man whose height is 185 cm casts a shadow of 210 cm. **2**
Find the angle of elevation of the sun's rays correct to the nearest minute.

(b)



Calculate the width "x" of the parallelogram, to the nearest centimetre. **2**

Question 4 continues on the next page

Marks

Question 4 (continued)

(c) A plane takes off at a horizontal angle of 32 45' and a speed of 360 km/h. **3**
After 2minutes the plane levels off and continues to fly at a constant altitude.
Calculate the altitude at which the plane continues to fly, correct to 2 decimal places.

(d) Town A is 72 km northeast of town B and town C is 45 km northwest of B. **3**
Show this information on a diagram.
Calculate the three-figure bearing from A to C, correct to the nearest degree.

End of paper

2009 Pathway 5.3+ Half Yearly Examination – Answers

1. (a) $15.50 per hour — 1
(b) (i) Sue earned $1391 — 1
(ii) Average earnings per day for the week = $278.20 (or $198.71 for those who used 7 days. — 1
(c) Clive washed 4 large dogs — 1
(d) Difference = $3.77 — 1
(e) John's sales are $11 250 — 2
(f) Bills bonus is $32400 — 2
(g) (i) Fred's monthly expenses $478.60 — 1
(ii) Fred's weekly expenses $119.65 — 1
(h) The minimum amount is $936 — 1
(i) Offer B is best – needs appropriate working — 2
(j) Fortnightly repayment is $52.31 — 2
(k) Value of Investment is $13584.38 — 2
(l) (i) Loading is $429.80 — 1
(ii) Total pay is $2885.80 — 1

2. (a) (i) 5.97×10^{-5} — 1
(ii) 1.2×10^{-3} — 1
(b) (i) $12x$ — 1
(ii) $7m^3$ — 1
(c) (i) $\frac{5}{6}$ — 2
(ii) 1 — 2
(d) $\frac{36}{q^4}$ — 1
(e) (i) 16 — 1
(ii) 1 — 2
(iii) 6 — 1
(iv) $-6x^2 + x$ — 2
(v) 2^{4x-2} — 2
(f) B - an extremely large number — 1
(g) $x = \frac{1}{2}$ — 2

$\frac{2p^2+p-6}{4p^2-9} \div \frac{p^3-4p^2-4p+16}{2p^2-p-6}$

3. (a) (i) $\frac{4d+3h}{6}$ — 1
(ii) $\frac{3}{a}$ — 2
(b) $\frac{2u}{5}$ — 2
(c) $\frac{4p}{5}$ — 1
(d) $m-2$
(e) (i) $5x(x+3)$ — 1
(ii) $-13y(2y+1)$ — 1
(iii) $(2m-5)(m-2)$ — 1
(iv) $2(4y-x)(4y+x)$ — 2
(v) $(a-5)(b+2)$ — 2
(vi) $\frac{3}{(x+2)^2(x-1)}$ — 3
(vii) $\frac{1}{p-4}$ — 3

4
(a) $41^\circ 23'$ — 2
(b) $x = 13\ cm$ — 2
(c) $h = 6.5$ — 3
(d) Bearing = 257° T — 3